

DEPARTMENT OF PHYSICS
LEHIGH UNIVERSITY

**PHYSICS IN MEDICINE:
A SELECTION OF TOPICS FOR BEGINNERS**

Physics 90: Freshmen Seminar

Fall Semester 2016

SYLLABUS (Please read carefully)

Many of the great developments in medicine, both in the diagnostics and the treatment of diseases as well as in the understanding of how the body works, originate from principles and technologies associated with physics. How do positron emission tomography (PET) or magnetic resonance imaging (MRI) work? What are radiotherapy or transcranial magnetic stimulation (TMS)? Why are we able to see objects around us and to listen to music? In this seminar, we will discuss answers to these and other questions while learning about important principles of classical and modern physics. This seminar is intended for all those who are interested in medicine, physics, or both, but does not require any previous knowledge or predisposition towards these fields. Topics will be approached qualitatively, with only a little elementary algebra needed now and then. At the same time, those who do envisage a career in medicine or the natural sciences will be able to stimulate their interests by getting a glimpse of some of the ideas they will study in more depth later.

Why This Seminar?

In addition to focusing on a topic we are all interested in, the main scope of a freshman seminar is getting you acquainted with – or more proficient in – some of the essential tools you will need to succeed as a college student, like reading and critically discussing texts that were meant for a specialized audience beyond high school, collecting additional information using tools such as the library or online databases, and presenting the result of our research on a particular subject both orally and in writing. In addition to that, attendance, regular homework, and some tests will help you build the necessary discipline and work habits that are indispensable for every thriving college student. Below you will find some information about the course, more details will be given during the semester.

Instructor

Prof. Paola M. Cereghetti

cereghetti@lehigh.edu

Office: LL 410

Office hours: I will be available Tuesdays and Thursdays after class at 12:00pm. To schedule an appointment at a different time, please e-mail me, thanks!

Class Meetings

We will meet every Tuesday and Thursday from 10:45am to 12:00pm in LL514.

Textbook and Class Notes

Although you do not need to buy this book, *Introduction to Physics in Modern Medicine (2nd. edition)* by Suzanne Amador Kane *et al.* is a very good presentation of many of the topics we will cover. Each student is responsible for taking notes for one lecture (I can help you if you need it!).

Attendance

Attendance is mandatory and will count towards your course grade. Should you miss a class for a valid reason or other extenuating circumstances: 1. Please let me know, possibly in advance, an e-mail is enough 2. Talk with me to discuss your absence and to make sure you understand the material you missed.

Homework

Homework will be assigned weekly by me or by the students presenting a particular topic.

Presentation on a special topic

You will need to prepare a presentation for the class on a topic about physics in medicine you are particularly curious about. This task includes:

- Preparing a 20 minutes computer-based presentation with slides
- Preparing 2 printed pages of class notes to share with everybody
- Preparing 2 problems (with solutions) to include in the weekly homework

Exams

There will be 2 multiple choice hour exams held during class. As a final exam, you will be assigned a random topic on physics in medicine (not all the students will have the same topic), and you will have 48 hours to write a short paper on that topic.

Grading:

Your numerical grade in the course will be determined as follows:

Class Notes	10
Attendance	20
Homework	20
Presentation	20
2 Hour Exams	20
Final Exam Paper	10

Total **100**

☞ If you can justify with an official written excuse your absence during a hour exam, the grade for the hour exam missed will be taken from the grade in the final exam paper.

Accommodations for Students with Disabilities:

If you have a disability for which you are or may be requesting accommodations, please contact both your instructor and the Office of Academic Support Services, Williams Hall, Suite 301 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

The Principles of Our Equitable Community:

Lehigh University endorses The Principles of Our Equitable Community [http://www.lehigh.edu/~inprv/initiatives/PrinciplesEquity_Sheet_v2_032212.pdf]. We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment inside and outside the classroom.